SESSION IX

A MICROPROCESSOR-BASED MULTIFUNCTION PSYCHOPATHOLOGY LABORATORY: A SYMPOSIUM

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A microprocessor-based psychopathology laboratory: I. Why bother?

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The greater than usual need for stimulus control, closed-loop design to control for organic state variables, and the acquisition of complex data on thought disorders makes on-line microprocessors especially important in psychopathology research.

One might reasonably ask why researchers in psychopathology need on-line computers. Three major reasons for this need can be derived from past literature. Following from these reasons, Huntzinger and Space (1979), Space and Huntzinger (1979), and Spaulding and Cromwell (1979) point out specific requirements and activities in our laboratory.

The first reason concerns the greater than usual need for stimulus and environmental control in laboratory research with pathological subjects, especially schizophrenics. In spite of the fact that schizophrenic patients may often appear unresponsive and out of contact, research has led to the growing awareness that they are often far more sensitive to the stimulus environment than are nondisturbed subjects. Slow simple reaction time has been one of the common characteristics of schizophrenic subjects. However, Nideffer and Cromwell (Note 1) found that, if the reaction time experiment is administered in a darkened room, thus reducing visual stimulation, the schizophrenic patient performs faster. In another study (Cromwell & Held, 1969), the differences between schizophrenics and normals failed to occur when subjects were tested with eyes closed. Nideffer, Deckner, Cromwell, and Cash (1971) found that normal subjects performed faster in reaction time with eyes opened, while schizophrenic patients performed faster with eyes closed. In the latter study, parallel differences were found with respect to total frequency of alpha waves in the electroencephalograph (EEG). A common finding in EEG research has been

that alpha (8-13 cps) waves are more frequent when eyes are closed than when open. This differential is of significantly greater magnitude in schizophrenics than in normals. Finally, on a less molecular level, Gelburd and Anker (1970) found that schizophrenics performed more and more poorly as a function of the visibility and proximity of the experimenter during task performance. These are some of the findings which emphasize that experimental stimuli, including auditory and written instructions, should be under computer control. Ordinarily, they are allowed the usual variation as the experimenter instructs and examines a subject.

The second reason for on-line computers concerns the fact that experimental psychologists, including those in psychopathology, need to control for organic state variables. In learning, perceptual, motor performance, and other tasks, much attention by researchers has been paid to the control of visual, auditory, and other environmental parameters; very little has been done to control for the organic state conditions under which these stimuli are presented. Lansing (1957) has shown that reaction time varies as a function of phase of the alpha wave when an imperative stimulus is presented. Lacey (1967) and others have shown that the responses of the organism differ under conditions of heart rate acceleration and deceleration. It should not be surprising that performance on a perceptual or motor task would be greatly different during the recovery phase following a massive galvanic skin response (GSR) as compared to when the GSR was at baseline level. Computer monitoring, of course, can allow organic state conditions to determine when a test trial is to be presented. While results from such closed-loop research

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designs are yet to be fully realized, the administration of stimuli under predefined organic states would inevitably refine research findings.

The third reason concerns the need to handle complex response-contingent testing procedures and their data analyses. For example, in the area of conceptual structure, it has long been known from psychoanalytic, Jungian, and word association research that lawful relationships exist among words and concepts. Not only can word association norms be constructed (Palermo & Jenkins, 1964) and semantic structure described (Osgood, 1954), but reliable individual differences exist in the relationship of words to words—so much so that we can talk about a given individual's conceptual structure. A reliable approach to individual conceptual structure becomes important in subjects with thought and cognitive disturbances, and the Kelly (1955) rep grid paradigm represents a useful solution to this problem. However, to sort out an individual's clusters of inter-related personal concepts through manual administration and analysis has been overwhelming for subjects and arduous for the examiner (Space, 1975). On the other hand, with the help of on-line computer techniques, the procedure can be administered to a subject pleasantly and efficiently, analyzed quickly, and output by the computer in narrative English language as well as tables. Thus, it is not vulnerable to the subjective and whimsical interpretations that have sometimes been true of clinicians using word association or projective techniques.

Because of the need for careful stimulus control in supersensitive subjects, the need for closed-loop studies to control for organic state variables, and the need to acquire and analyze complex psycholinguistic data pertaining to thought disorder, an on-line computer-aided assessment laboratory is being put into operation. The details of this endeavor are described by Huntzinger and Space (1979), Space and Huntzinger (1979), and Spaulding and Cromwell (1979).

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